SERIAL NO 10/600,571 **PATENT**
PRELIMINARY PAPER

REMARKS

The claims of the present application were finally rejected in application Serial No. 08/875,577. The decision of the Examiner finally rejecting the claims was affirmed on appeal in a decision of the Board of Patent Appeals and Interferences mailed April 23, 2003. Applicants have provided the following additional comments and request reconsideration of the patentability of the claims over the prior art cited in the final rejection in the parent application.

FEATURE OF THE PRESENT INVENTION

The present invention relates to a process for purifying exhaust gas from gasoline engines of the fuel-direct-injection type, which catalyst includes a noble metal and, preferably, a transition metal, as catalyst components.

Unlike an ordinary gasoline engine, the fuel-direct-injection type engine is such that only air is introduced into the cylinder from its inlet, and gasoline is directly introduced into the cylinder from its injector as a fuel, so as to ignite and explode the fuel inside the cylinder, thereby obtaining energy.

In the fuel-direct-injection type engine, gasoline whose

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amount is stoichiometrically smaller than introduced air is exploded, so that exhaust gas from the cylinder is in a hyperoxia atmosphere. Further, an absolute heat quantity is small since gasoline whose amount is smaller than the air is used, so that the temperature of the exhaust gas is lower than that of exhaust from an ordinary gasoline engine.

Low temperature is an unfavorable condition in a combustion reaction. That is, the fuel-direct-injection type engine has to purify the exhaust gas under an unfavorable condition as compared to an ordinary gasoline engine.

In the present invention, carbon monoxide and the like can be oxidized and nitrogen oxide can be reduced in the hyperoxia atmosphere.

The following are differences between (a) the present invention and (b) the cited references and a combination thereof.

The engine recited in Schlunke ('178) is a two stroke engine, and corresponds to the fuel-direct-injection type gasoline engine of the present application. The types of catalysts are used in Schlunke: a reduction catalyst and an oxidation catalyst.

The Office cites Katoh ('792) as an example of the two types

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of catalysts, i.e., the reduction catalyst and the oxidation catalyst.

However, in the present invention, it is possible to purify the exhaust gas by using a catalyst which includes a noble metal and, only preferably, includes a transition metal, without the difficulties of using the two catalysts.

Particularly, it is often that a zeolite catalyst is used as a nitrogen oxide reduction catalyst, but the zeolite catalyst has little oxidation capability, so that it is necessary to use an oxidation catalyst together therewith.

This point is apparent from a comparison of Examples and Comparative Examples that are set forth in the specification of the present application. The following table briefly compares the Examples with the Comparative Examples.

PRESENT EXAMPLES	PRESENT COMPARATIVE EXAMPLES
The exhaust gas from the fuel-direct-injection-type engine is purified by using a catalyst which carries platinum and rhodium with respect to active alumina (please see recitations in pages 20 to 21 of the specification)	The exhaust gas from the fuel-direct-injection-type engine is purified by using a catalyst which carries copper with respect to zeolite (please see recitation in page 21 of the specification)

That is, as pointed out in Schlunke, a reduction catalyst is

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insufficient, so that it is necessary to use the oxidation catalyst together. The pointed-out portion is extracted and shown as follows.

> *This is achieved by having the catalyst unit constructed from a number of sheet elements 241 stacked upon each other, the sheets varying in catalytic activity with the sheet at the top having only a reducing catalyst coating, and those at the bottom having only an oxidising and reducing catalyst depending on the nature of the exhaust gas and the required treatment thereof which may vary with different engines.*

As recited in the ABSTRACT of Katoh, an engine of Katoh is not a fuel-direct-injection-type gasoline engine, but a lean-burn engine, igniting lean mixture as fuel, in which a zeolite catalyst is used as a catalyst. The ABSTRACT is as follows:

> *An exhaust gas purification system includes a transition metal/zeolite first catalyst, a three-way second catalyst, and a noble metal-type third catalyst arranged in that order in the direction of exhaust gas flow in an exhaust conduit of an internal combustion engine capable of fuel combustion at least air-fuel*

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reactions. NOx which has not been purified by the transition metal/zeolite first catalyst is oxidized by the three-way second catalyst into NO_2, which the noble metal-type third catalyst can easily decompose into N_2 and O_2.

The combination of Schlunke and Katoh is such that: a reduction catalyst and an oxidation catalyst are used to purify the exhaust gas from a fuel-direct-injection-type gasoline engine, and a zeolite catalyst can be used as the reduction catalyst.

While, in the present invention, it is possible to purify the exhaust gas by using at least one catalyst. That is, in case of purifying the exhaust gas by using the zeolite catalyst used in Katoh, the zeolite catalyst corresponds to the catalysts of the Comparative Examples in the specification of the present application, so that this arrangement is extremely ineffective compared with the present invention. Such arrangement is the combination of Schlunke and Katoh.

Thus, the present invention cannot be easily conceived from each of or a combination of the disclosures and teachings of Schlunke and Katoh.

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Favorable reconsideration of the patentability of the claims of the present application is respectfully requested.

In the event any additional fees are required, please charge our Deposit Account No. 111833.

Respectfully submitted,

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